ARB AIR LOCKER

AIR OPERATED LOCKING DIFFERENTIALS

INSTALLATION GUIDE

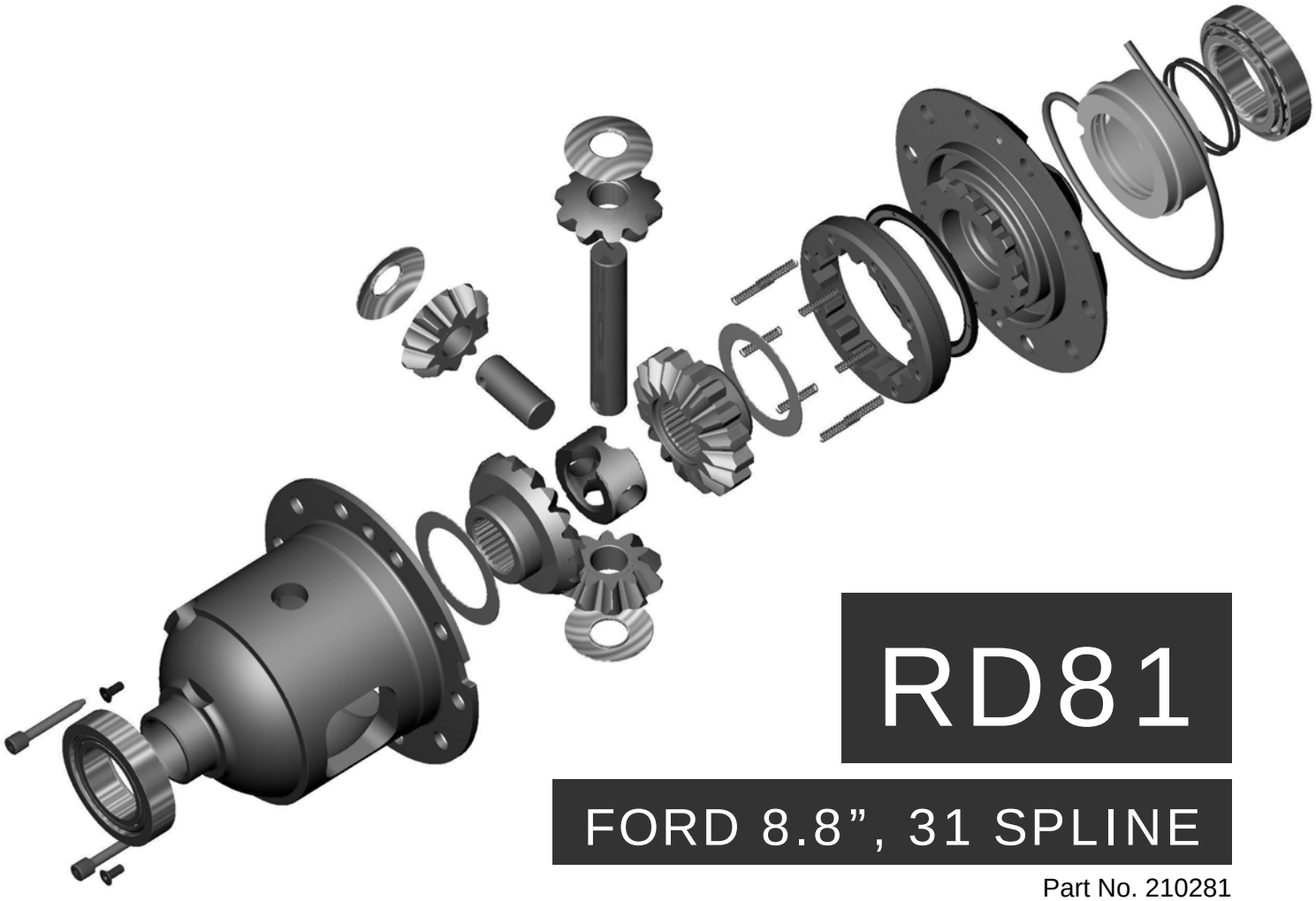

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Table of Contents:

1 Introduction 3
- **1.1** Pre-Installation Preparation 3
- **1.2** Tool-Kit Recommendations 4

2 Removing the Existing Differential 5
- **2.1** Vehicle Support 5
- **2.2** Differential Fluid Drain 5
- **2.3** Removing the Axles 5
- **2.4** Marking the Bearing Caps 6
- **2.5** Checking the Current Backlash Amount 7
- **2.6** Spreading the Differential Housing 8

3 Approximate Backlash Shimming 10
- **3.1** Bench Measurement 10
- **3.2** Calculation and Selection of Pre-Load Shims 12

4 Installing the Air Locker 13
- **4.1** Mounting the Ring Gear 13
- **4.2** Installing the Carrier Bearings 14
- **4.3** Drilling and Tapping the Bulkhead Port 15
- **4.4** Pre-Load Shimming 16
- **4.5** Checking the Backlash 18
- **4.6** Profiling the Seal Housing Tube 19
- **4.7** Setting up the Bulkhead Fitting 21
- **4.8** Re-Installing the Axles 23

5 Installing the Air System 24
- **5.1** Mounting the Solenoid 24
- **5.2** Running & Securing the Air Line 26
- **5.3** Connection to the Bulkhead Fitting 27

6 Mounting & Connecting the Electrical System 29
- **6.1** Mounting the Actuator Switch(es) 29
- **6.2** Wiring the Actuator System 30

7 Testing & Final Assembly 33
- **7.1** Leak Testing 33
- **7.2** Testing the Air Locker Actuation 33
- **7.3** Re-Sealing & Filling the Differential 34
- **7.4** Post-Installation Check List 35

8 Parts List 37
- **8.1** Exploded Assembly Diagram 37
- **8.2** Itemized Parts List 38

ARB AIR LOCKER
LOCKING DIFFERENTIALS

1 Introduction

IMPORTANT :

BEFORE ATTEMPTING TO DISMANTLE YOUR VEHICLE FOR THIS INSTALLATION, PLEASE READ THIS INSTALLATION GUIDE IN ITS ENTIRETY, AS WELL AS ALL APPLICABLE SECTIONS OF YOUR VEHICLE MANUFACTURER'S SERVICE MANUAL.

1.1 Pre-Installation Preparation

This booklet is to be used in conjunction with your vehicle manufacturer's service manual. ARB endeavors to account for every possible variation in vehicle model when publishing its installation guides, and guides are updated regularly as new model information becomes available, however, the rapid and globally varied release of some vehicles makes it difficult to insure that your vehicle model has been accurately accounted for. In the case of any technical discrepancies between this guide and your service manual, we strongly advise that you adhere to the specifications and techniques as documented in your service manual.

Although your *ARB Air Locker* comes complete with all the step by step instructions you will need to supplement your vehicle manufacturer's service manual and install your new differential, ARB recommends that you have your *Air Locker* installed by a trained professional. Many ARB distributors around the world have been fully instructed in *Air Locker* installations by ARB, and have gained a wealth of experience and skill from years of performing similar installations.

Once you begin this installation your vehicle will be immobile until all steps of the installation are complete. Make sure your *Air Locker* kit is the correct model for your vehicle and that it contains all of the parts listed on back cover of this booklet. Also be sure you have appropriately equipped yourself with all the necessary tools, parts, and materials to complete this installation (see Section 1.2 *Tool-Kit Recommendations*), and that you have allowed for an appropriate amount of vehicle down time.

HINT : **Place a ✓ mark inside each of the ☐ symbols as you complete each step. It is very important NOT to miss any of the steps!**

1 Introduction

1.2 Tool-Kit Recommendations

Below is a list of tools and supplies you may need to complete this installation. Requirements for your vehicle may vary. Please consult your vehicle service manual for additional recommendations.

1.2.1 Tools

- ☐ Standard automotive sizes (metric and/or imperial) of sockets, wrenches, Allan keys, and drills.
- ☐ A dial indicator or other suitable measuring tool for checking ring & pinion backlash.
- ☐ A razor knife for nylon tubing.
- ☐ A differential housing spreader for setting bearing pre-load.
- ☐ A torque wrench (See vehicle service manual for required torque range)
- ☐ A lubricant drain reservoir.
- ☐ Suitable measuring tools to measure a differential for pre-load shimming. (See Section 3 *Approximate Backlash Shimming*)
- ☐ A 11.2mm [7/16”] drill and ¼”NPT tap for bulkhead fitting installation.
- ☐ Needle-nosed pliers.
- ☐ An automotive bearing puller (2 jawed) or a differential carrier bearing puller.
- ☐ A bearing press or arbor press.

1.2.2 Supplies

- ☐ Thread lubricant/sealant compound (e.g., LOCTITE #567)
- ☐ Thread locking compound (e.g., LOCTITE #272)
- ☐ A gasket sealant or replacement gasket for your differential cover.
- ☐ A sufficient volume of differential oil to completely refill your housing. (see the *ARB Air Locker Operating and Service Manual* for recommended lubricants)
- ☐ A soap and water mixture to test for air leaks.
- ☐ Teflon paste.
- ☐ A selection of differential bearing shims to set-up pre-load and backlash. (see Section 3 *Approximate Backlash Shimming*)

2 Removing the Existing Differential

2.1 Vehicle Support

- ☐ Safely secure the vehicle on a hoist. We recommend supporting the vehicle on a chassis hoist to keep the differential area at a convenient working height and to leave the wheels and axles free to be rotated and removed.
- ☐ Once supported in the air, release the parking brake and leave the vehicle in neutral. Chock the wheels if necessary.

2.2 Differential Fluid Drain

- ☐ Clean around the differential cover seal to prevent dirt from entering the differential.
- ☐ Position a fluid drain reservoir under the differential and loosen all differential cover retaining bolts.
- ☐ Gently pry the cover away from the differential housing to completely drain all differential fluid.
- ☐ Once drained, remove differential cover.

HINT : **This is a good time to check for metal particles in your oil and in the bottom of the housing which may indicate a worn bearing or differential component.**

2.3 Removing the Axles

IMPORTANT :

Collision damage or heavy off-road use of your vehicle in the past may have resulted in some degree of bending in the axle. Any misalignment of the axle tubes may result in excessive wear and/or failure of your differential and axle shafts. ARB strongly recommends that you have your axle assembly inspected for concentricity and straightness before installing your *Air Locker*.

2 Removing the Existing Differential

- ☐ Remove the wheels and brake assembly according to your vehicle's service manual.
- ☐ Rotate the differential center until the cross shaft can be removed.
- ☐ Remove the cross shaft retaining pin and the cross shaft.
- ☐ Rotate the differential until the 'C' clip access window is accessible.
- ☐ Gently tap the axle ends inward to release the 'C' clips.
- ☐ Remove 'C' clips with needle nose pliers.
- ☐ Gently tap axles outward and remove them from the differential center.

NOTE : **Rubber oil seals can be easily damaged. Support the weight of the axle when extracting it across the edges of the seals.**

2.4 Marking the Bearing Caps

- ☐ Using a small pointed center punch, gently mark the left bearing cap in a way which will enable you to know which cap is 'LEFT' and 'RIGHT', and which way is 'UP' and 'DOWN'. (Fig.1.)
- ☐ Mark the right hand cap in a similar way.

HINT : **Many installers choose to make one punch mark on the left hand side of the left hand bearing cap and a similar mark on the housing at close proximity to the cap mark. The right hand side is then designated with two punch marks on the right hand side of the cap and two similar punch marks on the housing.**

Figure 1.

2 Removing the Existing Differential

2.5 Checking the Current Backlash Amount

IMPORTANT:

This step is a precautionary measure recommended by ARB due to the fact that some after market ring and pinion sets have been manufactured to run with different backlash settings than those specified by your vehicle manufacturer. Although ARB must recommend you set backlash according to your service manual guidelines, we also advise that you compare the backlash measurements taken here to the recommended backlash settings in your vehicle service manual. Measurements found to be outside of your service manual recommendations may indicate the need to deviate from those settings in order to achieve quiet running with a good contact mark.

Refer to your vehicle service manual or your local authorized ARB installer for more information.

☐ Set a depth indicator on one of the ring gear teeth as in Figure 2.

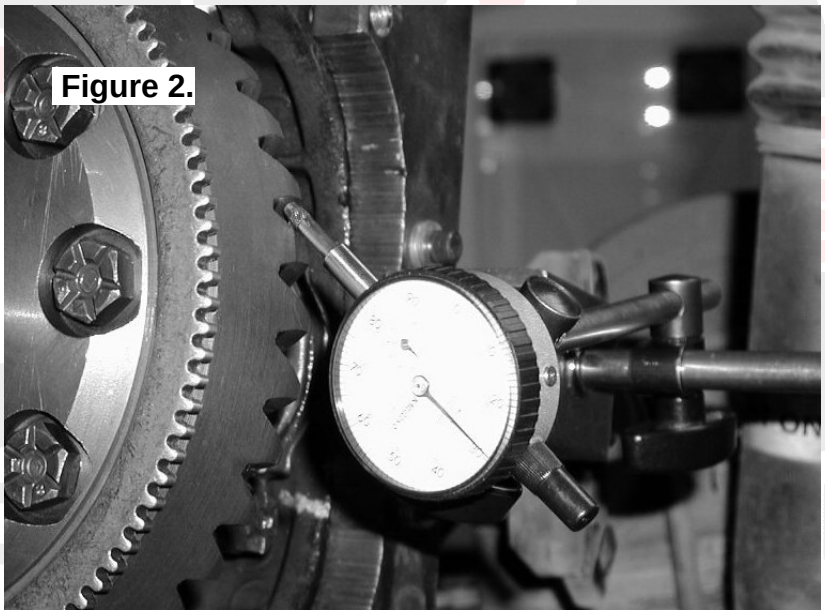


Figure 2.

☐ While supporting the pinion gear by holding the drive shaft, rotate the differential in both directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value). This value is referred to as the ring and pinion backlash.

☐ Rotate the differential center 90° and measure again for accuracy.

☐ Record the average of all measurements.

2 Removing the Existing Differential

2.6 Spreading the Differential Housing

IMPORTANT:
Spreading the differential housing with a differential case spreader is a step which is critical to set up bearing pre-load when a differential is installed. Improper pre-load will result in undue bearing wear, increased stresses in the differential center, increased running noise, and ultimately, ring and pinion gear damage.

☐ Unbolt and remove the bearing caps.

HINT : **Be sure not to mix up the left and right hand tapered roller bearing cups or pre-load shims. Later it will be necessary to know which cup came from which bearing and which shim came from which side.**

☐ Carefully spread the differential housing (Fig. 3.) just enough to remove the differential center (Refer to your vehicle's service manual).

NOTE : **Never spread the housing more than 0.5mm [0.02"].**

☐ Once the housing has been adequately spread, the differential may be removed by pulling forward on the differential center.

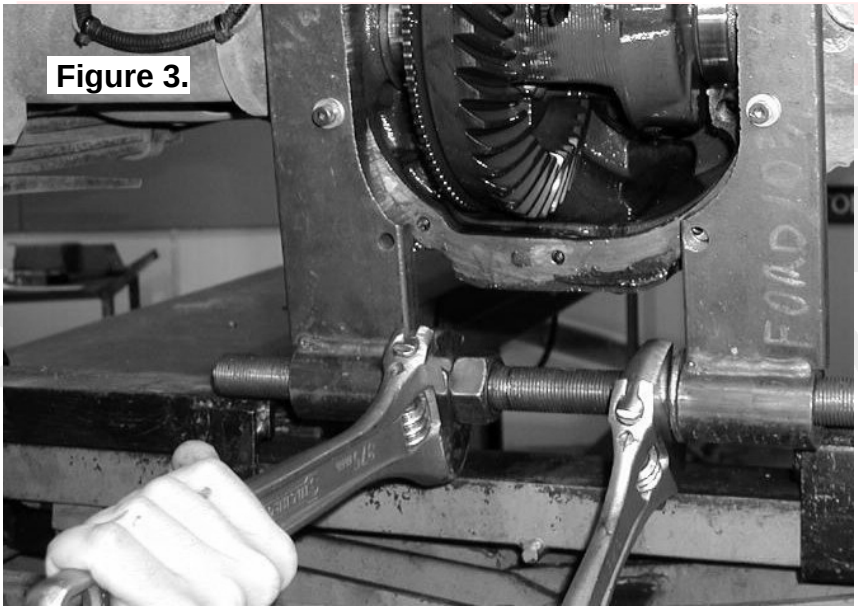


Figure 3.

NOTE : **The differential center is heavy and quite difficult to handle when covered in oil. Do not drop it!**

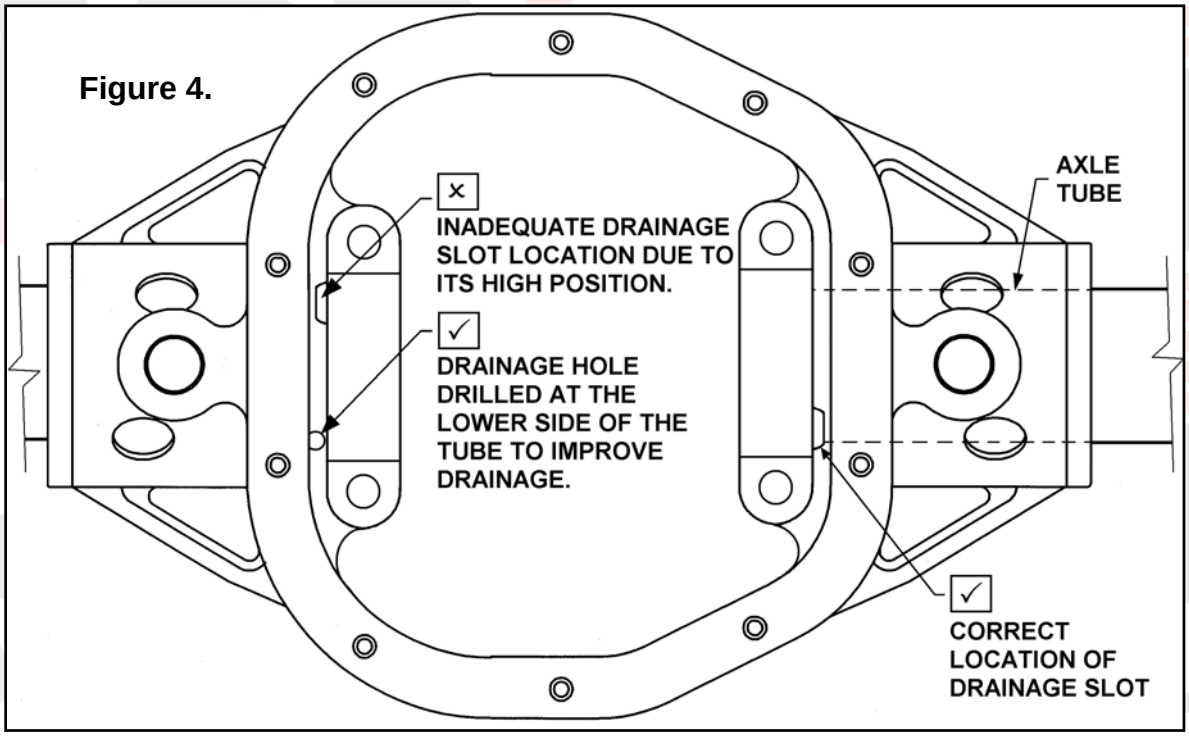
2 Removing the Existing Differential

IMPORTANT:

Some Salisbury axles were manufactured with poor oil drainage between the axle tubes and the differential housing. This can often result in one of the axle tubes filling up with differential oil while running. In most cases this will result in a blocked air vent which will cause the differential housing to pressurize and expel oil from the axle seals at the wheels or force oil into the air system of the *Air Locker*, eventually expelling oil at the solenoid valve. This is a design flaw which was corrected by most automakers in the later releases of their axle assemblies. If no lower drainage point is present in the differential housing then it is critical that you modify the housing to include one.

☐ Inspect the differential housing for the presence of adequate drainage in both axle tubes (refer to Fig.4.).

Figure 4.



☐ If drainage is inadequate or does not exist then a slot or hole should be cut into the housing on the lower side of the tube(s) to allow oil out of the axle tube area.

NOTE : **Make sure any grinding dust, filings or drill chips left behind by cutting the drainage slots is completely cleaned out of the housing.**

☐ Check that the axle air vents are clear and working correctly.

3 Approximate Backlash Shimming

3.1 Bench Measurement

In order to reproduce a similar pre-load and ring and pinion backlash in your *Air Locker* to that of your existing differential, measurements need to be taken so that a shim thickness can be calculated.

- ☐ Secure the differential to a work bench.
- ☐ Remove the bolts that hold the ring gear in place.
- ☐ Using a plastic or copper hammer, tap in a circle around the ring gear to separate it from the differential carrier.
- ☐ Remove the original bearings from the differential center using a bearing puller.

NOTE : **Keep all shims and bearings separated so that they can be identified as to which end of the differential they came from.**

- ☐ Examine the bearing cup and cone from Figure 5. for damage or wear and, if necessary, discard it and replace it with the same size and type of bearing.

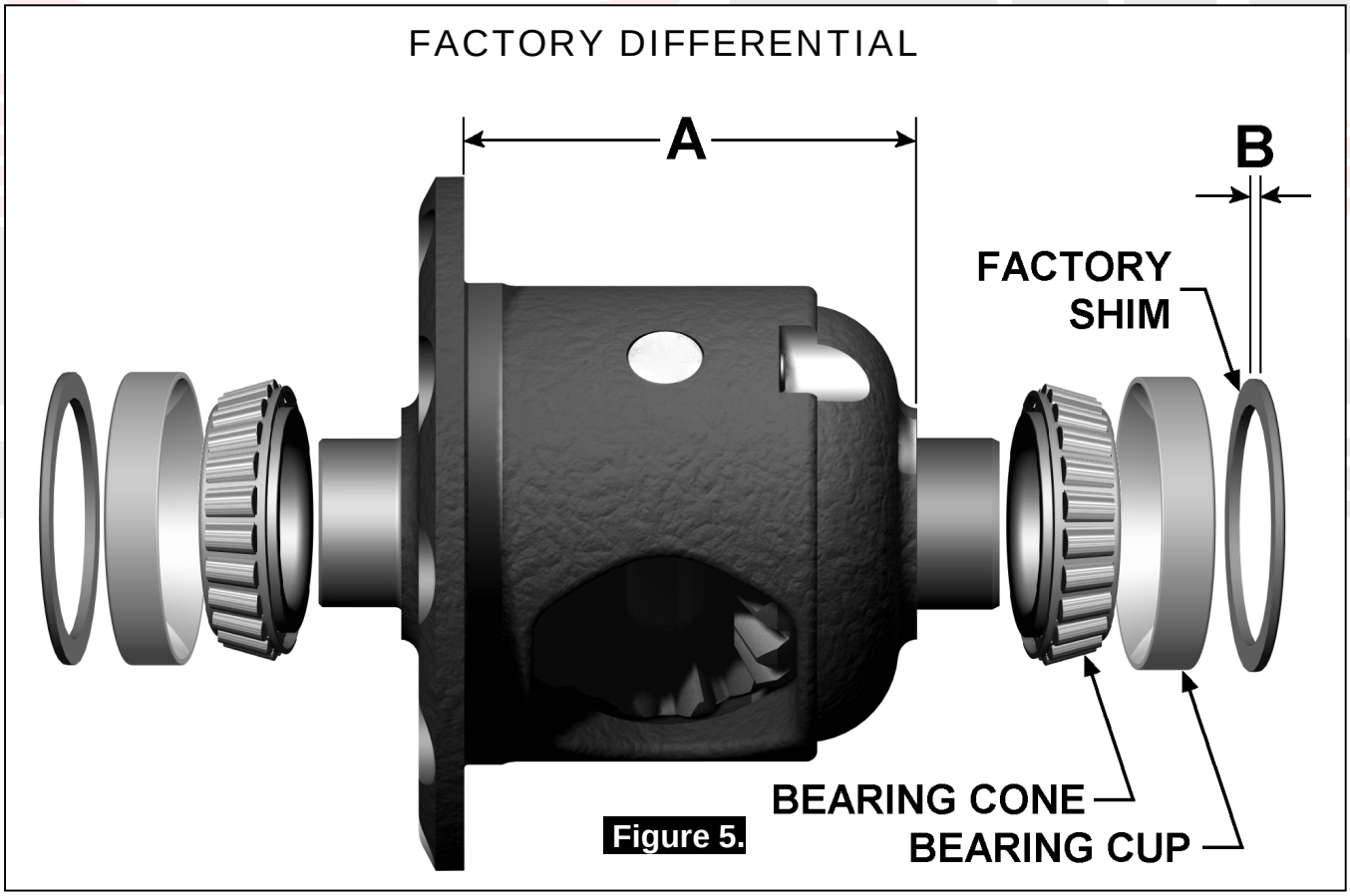


Figure 5.

3 Approximate Backlash Shimming

☐ Using a caliper or similarly accurate measurement method (i.e., able to take accurate measurements within 0.04mm [0.0015”]), measure the distance from the shoulder of the bearing journal to the ring gear mounting face (shown as ‘**A**’ in Figure 5.) and record this measurement as ‘**A**’.

☐ Measure the thickness of the factory shim removed from the end of the differential carrier (shown as ‘**B**’ in Figure 5.).and record this measurement as ‘**B**’.

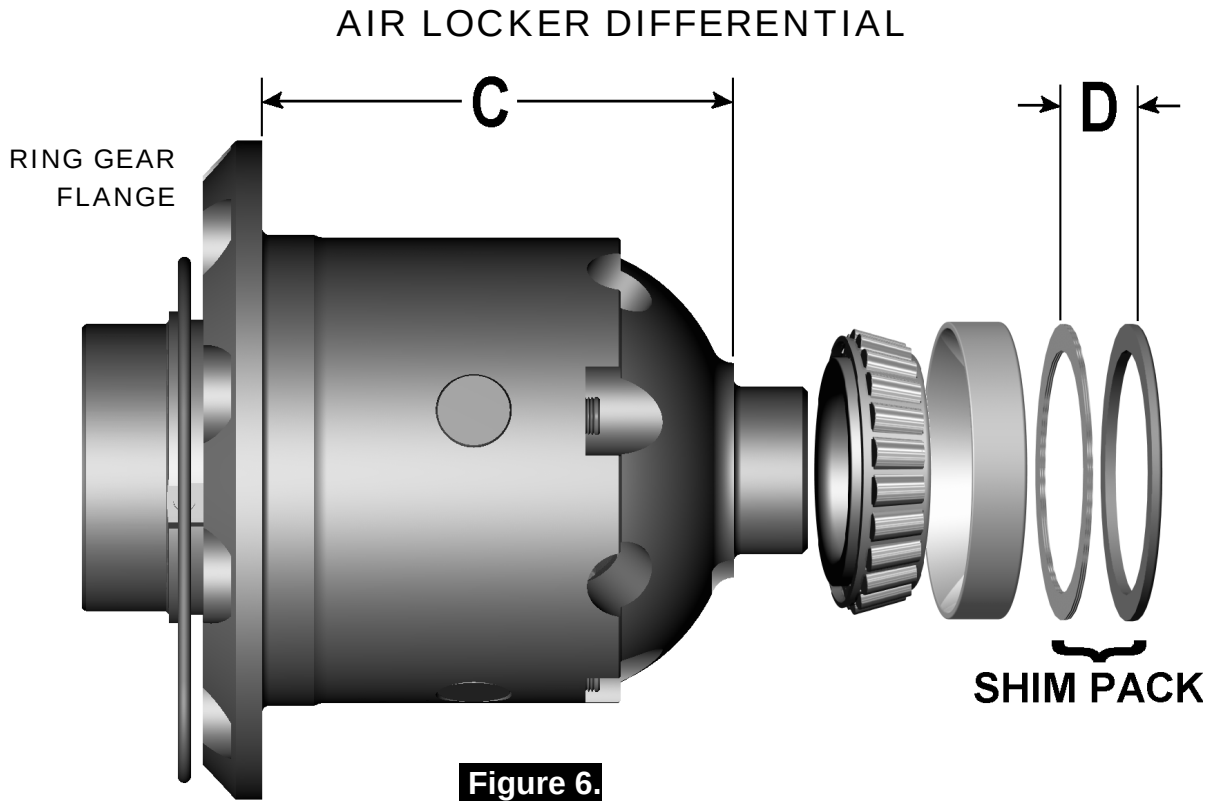


Figure 6.

☐ Measure the distance from the *Air Locker* bearing shoulder to the ring gear mounting face (shown as ‘**C**’ in Figure 6.) and record this measurement as ‘**C**’.

3 Approximate Backlash Shimming

3.2 Calculation and Selection of Pre-Load Shims

Ideally, the measurement you recorded as '**C**' from the *Air Locker* differential will closely match '**A**' on the existing differential (within 0.1mm [0.004"]) and then the factory shim can be reused, however, quite often these measurements will vary slightly between one factory differential and the next.

If this is the case you must create a new shim pack thickness by using the measurements you recorded earlier to find a desired measurement for '**D**' in Figure 6.

Use the following calculation:

A + B – C = D (Replacement Shim Pack)

HINT : **If your calculations are correct then the following equation will also be true:**

A + B – C – D = ZERO

To achieve the desired shim thickness you can:

- Machine down the factory shim thickness.
- Add shims between the factory shim and the bearing cup.
- Purchase new factory shims at the desired thickness.
- Use a universal shim kit available from most drive train specialists.
- Add small amounts of shim between the bearing cone and the bearing seat.

NOTE : **NEVER machine the *Air Locker*.**

4 Installing the Air Locker

4.1 Mounting the Ring Gear

IMPORTANT:

Higher ratio gearing uses deeper (thicker) ring gears with teeth that extend much further. Make sure the teeth of the ring gear will not obstruct the removal of the cross shaft when fitted. If so, ARB recommends that you grind just enough off of one of the ring gear teeth to successfully remove the cross shaft.

DO NOT MODIFY THE CROSS SHAFT!

NOTE : **If your existing differential was fitted with a toner ring for ABS brakes, it will need to be removed and installed onto the *Air Locker* before the ring gear can be mounted. See your vehicle service manual.**

- ☐ Apply a thin film of high pressure grease to the ring gear shoulder of the *Air Locker* to prevent seizing.
- ☐ Thoroughly clean any thread locking compound or other foreign matter from the holes of the ring gear, the threads of the ring gear bolts, and the mating surfaces between the ring gear and the *Air Locker* flange.

HINT : **Stoning the ring gear mounting face before installation will remove any high spots around the threads.**

- ☐ Heat the ring gear to between 80 and 100°C [175 - 212°F] in hot water or in an oven to slightly expand the gear and facilitate assembly.

NOTE : **NEVER HEAT GEARS WITH A FLAME! This could damage the hardened surface of the gear and result in premature wear or failure.**

- ☐ Dry the gear and bolt holes with compressed air (if wet).
- ☐ Install the ring gear onto the *Air Locker* by aligning the bolt holes and then gently tapping it around in a circle with a soft mallet. Avoid using the bolts to pull down the ring gear as this puts excess strain on the bolts and the differential flange.
- ☐ Apply a thread locking compound to the thread of each ring gear bolt before inserting it. Do not apply threading compound directly into the threaded hole as this could prevent the bolt from reaching its full depth.
- ☐ Tighten the ring gear bolts in a star pattern with a torque wrench according to your vehicle manufacturer's specified torque.

4.2 Installing the Carrier Bearing

- ☐ Apply a thin film of high pressure grease to the bearing journal of the *Air Locker.*
- ☐ Using a bearing press or arbor press, press one of the bearing cones which was removed from the original differential onto the bearing journal (refer to Figure 7.) until the bearing seats firmly against the bearing journal shoulder.

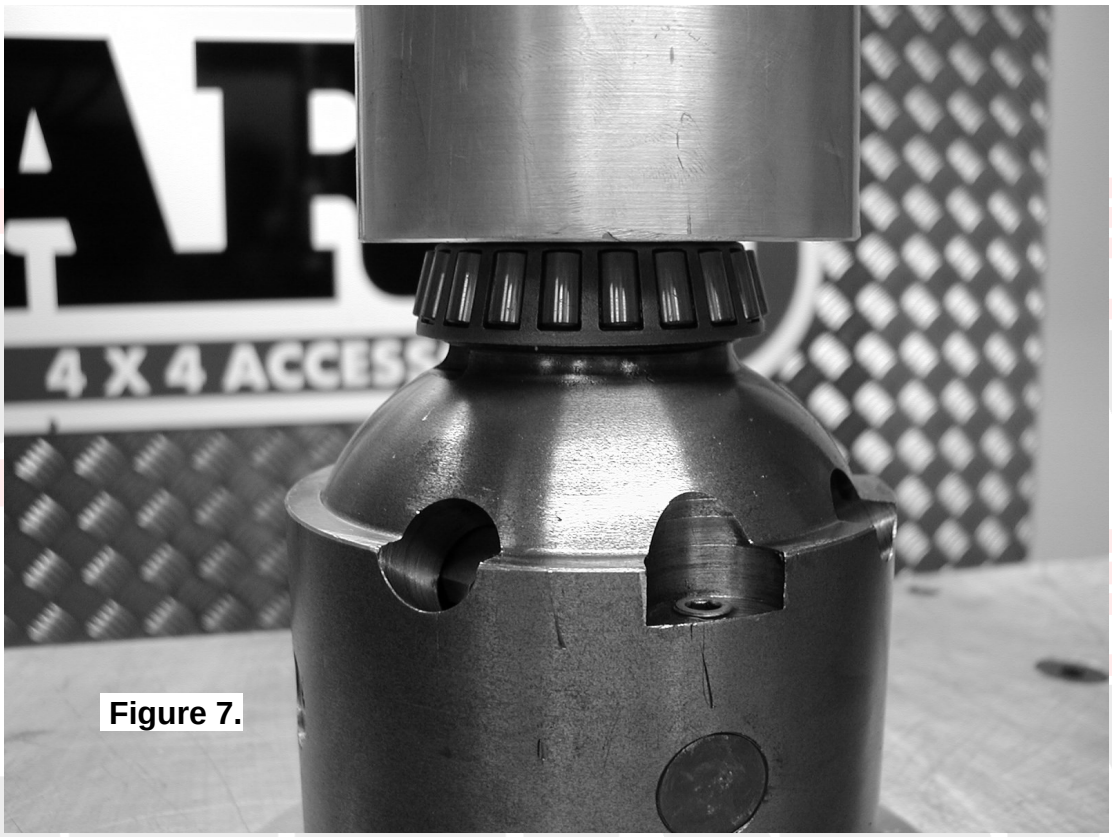


Figure 7.

NOTE : **Never re-use any bearings which are damaged or worn.**
Do not bend or damage the seal housing tube.

4.3 Drilling and Tapping the Bulkhead Port

An airline port must be drilled and tapped through the differential housing to mount the bulkhead fitting into.

☐ Mark a spot on the top of the outside shell of the differential housing that will be clear of the ring gear position once the seal housing tube has been installed. Figure 8. shows how the tube will port through the differential housing.

NOTE : **Higher ratio gearing uses deeper (thicker) ring gears with teeth that extend much further. Make sure the intended hole location is far enough away from the ring gear teeth that the air line will not be at risk of contact with the current or future ring gears.**

Figure 8.

☐ Cover the drive pinion and axle tube areas with a rag to protect them from metal filings.

☐ Drill through the housing square to the outside surface using a 11.2mm [7/16”] drill. (Figure 9.)

Figure 9.

4 Installing the Air Locker

- ☐ Tap the hole from the outside using a ¼" NPT pipe tap.
- ☐ Remove any sharp edges from the hole that may chip-off and fall into the housing.
- ☐ Carefully remove rags and inspect with a service light inside the housing to insure no metal filings are left behind.

4.4 Pre-Load Shimming

In order to pre-load the tapered roller bearings in your *Air Locker*, measurements need to be taken so that a value can be calculated for the total shim thickness **'E'** in Figure 10.

- ☐ Remove the long cross shaft of the *Air Locker* by removing the retaining pin located one quarter turn from the access window in the side of the carrier.
- ☐ Relieve all tension on the housing spreader.
- ☐ Hold the bearing cups in place over their matching bearing cones.

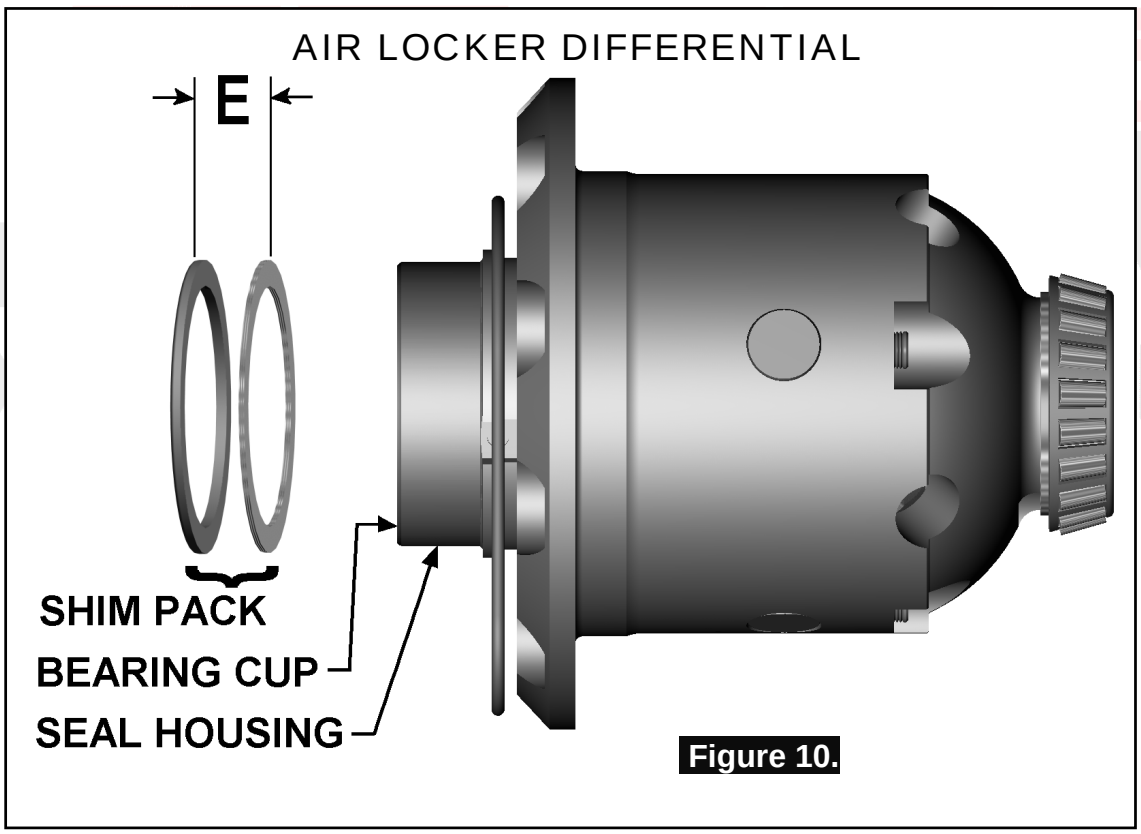


Figure 10.

4 Installing the Air Locker

☐ Insert and hold the *Air Locker* into the differential housing.

NOTE : **Be careful not to bend or damage the seal housing tube.**

☐ Insert the shim pack determined earlier as **'D'** between the bearing cup (right hand side as shown in figure 6.) and the differential housing. Lightly tap the shim pack in if required.

☐ Push (or lightly pry) the *Air Locker* hard across to the right-hand side, and measure the gap (also called the 'end float') between the face of the bearing cup (slightly protruding from the seal housing) and the bearing seat of the housing with a feeler gauge.

☐ Consult your vehicle manufacturer's service manual to determine the carrier bearing pre-load amount specified for your vehicle.

☐ Add the specified pre-load amount to the measurement taken with the feeler gauge to determine a shim amount for **'E'** in Figure 10.

PRE-LOAD + END FLOAT = SHIM PACK

☐ Create a shim pack to match **'E'**.

To achieve this desired shim thickness you can:

- Machine down the factory shim thickness.
- Add shims between the factory shim and the bearing cup.
- Purchase new factory shims at the desired thickness.
- Use a universal shim kit available from most drive train specialists.

NOTE : **Do not add shims between the bearing cone and the bearing seat and <u>NEVER</u> machine the *Air Locker*.**

☐ Spread the differential housing again (Refer to section 2.6).

☐ Install the shim pack between the bearing cup and the differential housing.

NOTE : **If the shim pack is too difficult to install then the spreader tension may need to be increased. <u>Do not spread the housing more than 0.50mm [0.020"].</u>**

☐ Rotate the seal housing so that the solder joint of the tube points straight outward.

☐ Release all spreader tension.

4 Installing the Air Locker

- ☐ Install the bearing caps oriented as they were marked before they were removed, and tighten the bearing cap bolts. It is not necessary to torque them down at this time.
- ☐ Check that some backlash can be felt between the ring and pinion gears. No backlash would be an early indication of incorrect shim thickness.

4.5 Checking the Backlash

- ☐ Relieve all tension on the housing spreader.
- ☐ Tighten all bearing cap bolts with a torque wrench to the torque specified in your vehicle manufacturer's service manual.
- ☐ Set a depth indicator on one of the ring gear teeth as in Figure 11.
- ☐ While supporting the pinion gear by holding the drive shaft, rotate the differential in both directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value). This value is referred to as the ring and pinion backlash.
- ☐ Rotate the differential center 90° and measure again for accuracy.

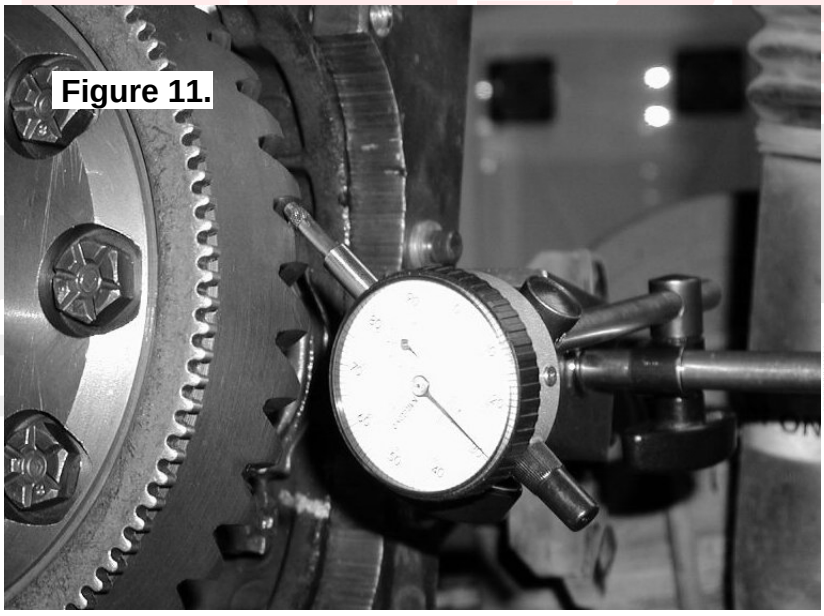


Figure 11.

- ☐ Refer to your vehicle service manual for the specified maximum and minimum amounts of backlash. If the backlash is not within the specifications then the differential will have to be removed and re-shimmed.

4.5.1 Re-Shimming the Backlash

NOTE : **This step is only necessary when adjusting for incorrect backlash.**

☐ Reapply the spreader to the differential housing.

☐ Remove the bearing caps.
☐ Remove the differential.
☐ To decrease the amount of backlash, reduce the shim thickness '**D**' (Fig. 6.) and increase the shim thickness '**E**' (Fig10.) by the same amount. Reverse this step to increase the backlash.
☐ Remount the differential as before.
☐ Release spreader tension.
☐ Check backlash again as before.

4.6 Profiling the Seal Housing Tube

☐ Completely remove the differential spreader.
☐ Without using sharp, jagged tools such as pliers (usually your hands are the best tool for this job), bend the seal housing tube so that it runs under the ring gear and upwards protruding through the bulkhead port in the differential housing. (Fig. 12. & Fig. 13.)
☐ Check that the contour of the tube will not interfere with the *Air Locker* or the ring gear.

NOTE : **It is a good idea to keep the tube away from the bearing caps or any other part of the differential casting as any contact due to vibration or shock may wear the tube and eventually cause a leak.**

4 Installing the Air Locker

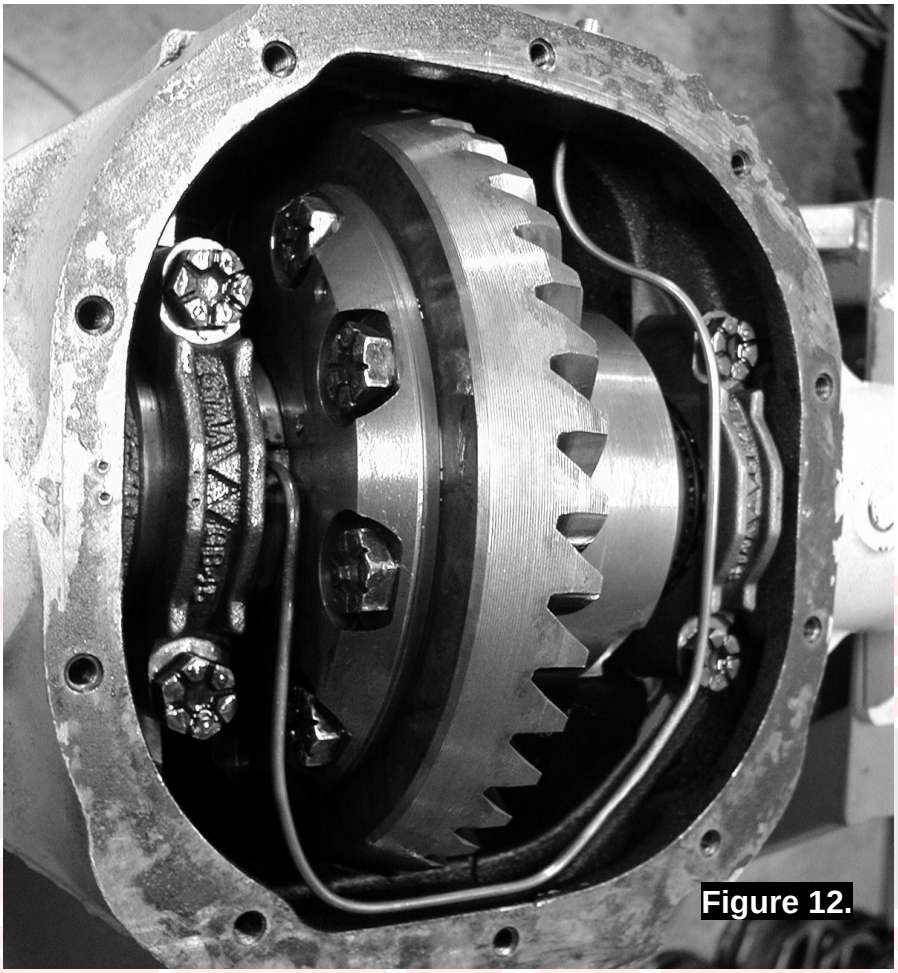


Figure 12.

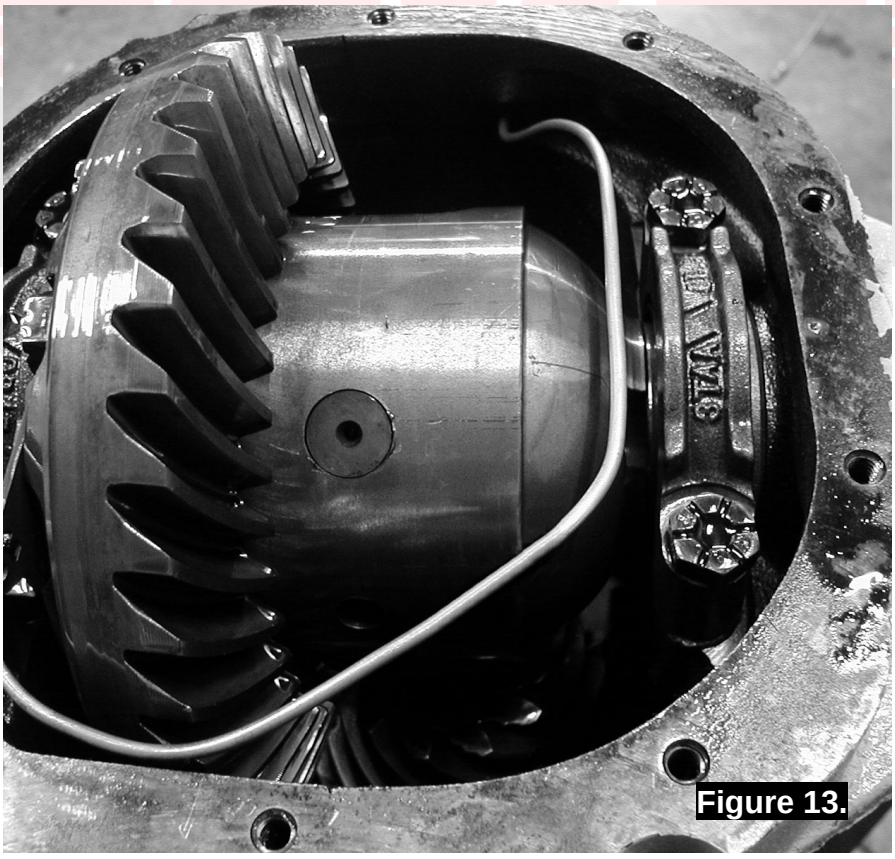


Figure 13.

4 Installing the Air Locker

4.7 Setting up the Bulkhead Fitting

☐ Trim the seal housing tube that is extended outside the differential housing to approximately 20-25mm [0.8-1.0”] of extension using an automotive brake line tubing cutter.

NOTE : **Never use a hacksaw for trimming the steel tube as this will leave metal fillings in the air system.**

☐ Apply thread sealant to the threads of the bulkhead body.

☐ Screw the bulkhead body into the tapped hole, and tighten.

☐ Wipe the area clean of any excess thread sealant (inside and outside of the housing).

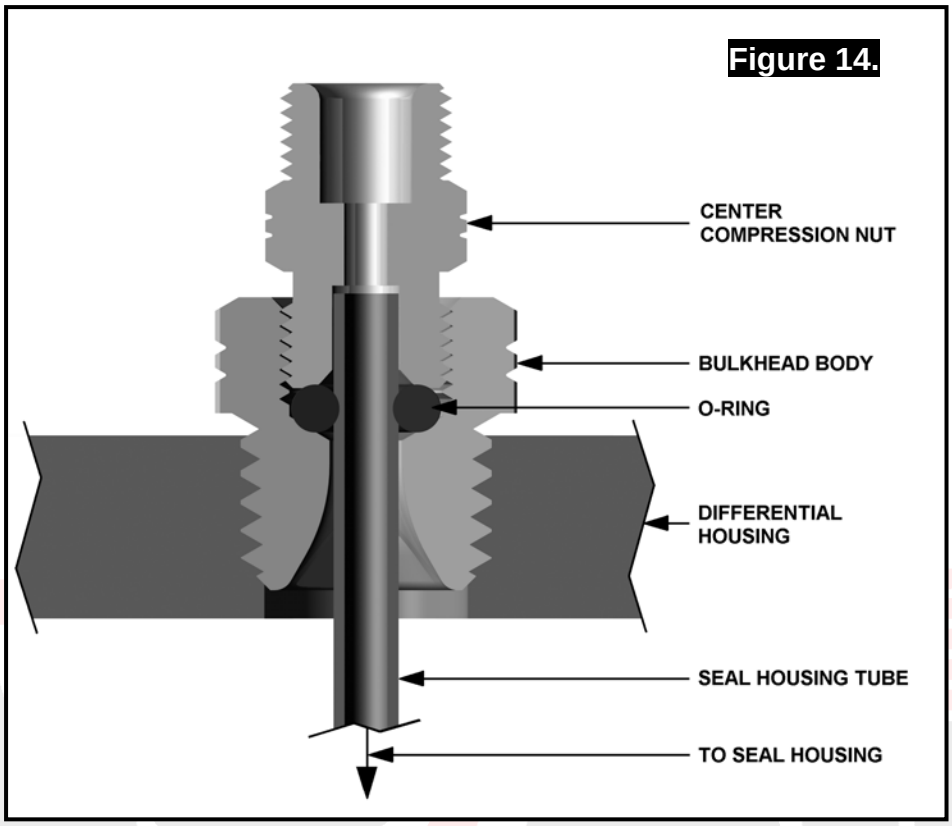
☐ From the outside of the housing, assemble the small O-ring over the top of the short length of seal housing tube protruding through the bulkhead fitting.

☐ While holding the seal housing tube into the bulkhead fitting, insert the small drilled end of the center compression nut over the extended tube as shown in the assembly diagram (Fig. 14.), and screw it into the bulkhead body, and lightly tighten.

NOTE : **Be sure to insert the correct end of the center compression nut into the bulkhead body. The thread has been partially relieved on the bulkhead side of the center compression nut to visually identify its orientation. (Fig. 14.)**

ARB LOCKER LOCKING DIFFERENTIALS

4 Installing the Air Locker



NOTE : **Excessive tightening of the center compression nut is not necessary to form a good seal around the tube and may damage the O-ring, the seal housing tube, or the threads of the compression nut.**

NOTE : **Make sure the seal housing tube is all of the way into the center compression nut while you are tightening it.**

☐ Again check that no part of the seal housing tube comes in contact with the moving differential components. Less than 8mm [5/16”] should be considered too little clearance. Gently bend the tube away from moving parts if necessary.

4 Installing the Air Locker

4.8 Reinstalling the Axles

- ☐ Unscrew and remove the long cross shaft retaining pin with a 5mm hex key.

NOTE : **The long cross shaft retaining pin is the pin located exactly one quarter turn of the differential from the 'C' clip access window. Rotate the differential using the drive flange.**

- ☐ Completely remove the long cross shaft.
- ☐ Rotate the differential center until the 'C' clip access window in the differential is in view and accessible.
- ☐ Insert both axles fully into the housing and gently tap them inward.

NOTE : **Be careful not to damage oil seals with the axle.**

- ☐ Install the 'C' clips on to the ends of the axles.
- ☐ Gently tap the axles outward until both 'C' clips are fully seated.
- ☐ Insert the cross shaft maintaining alignment between the cross shaft retaining pin hole in the differential and its corresponding hole in the cross shaft.
- ☐ Ensure that some degree of axle end float exists (i.e., some clearance exists between the end of the axle and the cross shaft or thrust block). 'C' clips may need to be substituted with others of a different thickness to achieve correct end float if too tight or too loose. Refer to your vehicle manufacturer's service manual for the procedure on setting up the correct end float condition.
- ☐ Reinstall and tighten the retaining pin with a 5mm hex key.
- ☐ Reassemble brakes and wheels according to your vehicle's service manual.

ARB LOCKER LOCKING DIFFERENTIALS

5 Installing the Air System

5.1 Mounting the Solenoid

5.1.1 Connection to an ARB Air Compressor (Fig.15.)

- ☐ Remove one of the 1/8” BSP plugs from its port in the compressor tank.
- ☐ Apply Teflon paste to the nipple (1/8” X 1/8” BSP) and insert it into the port and tighten.
- ☐ Apply Teflon paste to the free end of the nipple.
- ☐ Assemble the inlet port side of the solenoid (stamped with a ‘1’) onto the nipple and hand tighten it. The solenoid should be rotated into a position which does not obstruct any other ports on the compressor tank.

NOTE : **The solenoid exhausts compressed air through the center of the black retaining cap when the *Air Locker* is disengaged. Make sure this orifice cannot be obstructed.**

- ☐ Apply Teflon paste to the threads of the 5mm push-in fitting and assemble it into the solenoid outlet port (stamped “2”) and hand tighten.

ARB

Air Compressor

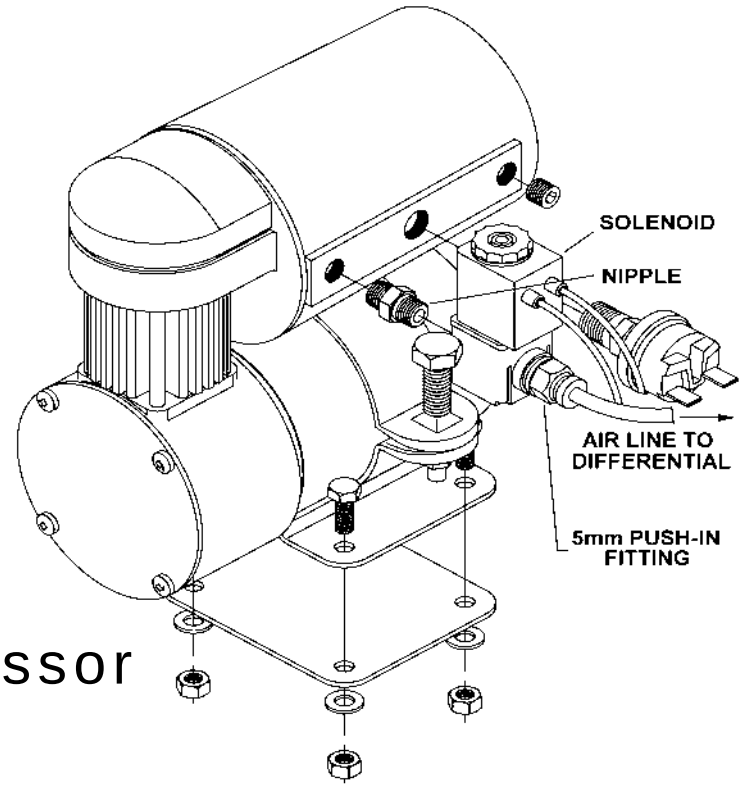


Figure 15.

5.1.2 Connection to an Alternate Air Source

For ease of installation, quality of air supply, and a high level of dependability from your *Air Locker*(s), ARB strongly recommends use of a genuine *ARB Air Compressor*, however, the *Air Locker* air system can be operated on any alternate air source that meets each of the following guidelines:

- ☐ Must supply a minimum of 85PSI [586kPa].
- ☐ The supply must never exceed 105PSI [724kPa].
- ☐ The air source should have a tank capacity which enables it to actuate the Air Locker(s) in one charge so that no hesitation is experienced when locking one or two differentials.

HINT : **A good way to insure that you have the necessary capacity is to make sure you can engage, disengage, and then reengage your *Air Locker*(s) without the air source having to regenerate (e.g., without the compressor turning on to refill the tank).**

- ☐ Must supply clean air, free of rust, dirt, water, or other foreign matter.
- ☐ Must match the 1/8” BSP porting of the *Air Locker* solenoid.

- ☐ Mount solenoid within close proximity of the air supply and secure it from the effects of vibration and shock.
- ☐ Connect the air supply to the 1/8” BSP inlet port of the solenoid (stamped “1” on the solenoid body) using thread sealant.

IMPORTANT :

ARB cannot warranty your *Air Locker*(s) against damage caused as a result of using an alternate air supply. If you have any doubts as to the suitability of your air system to use in an *Air Locker* system, consult your ARB distributor.

5.2 Running and Securing the Air Line

The path taken by the air line from your air source (i.e., compressor) to your *Air Locker* is unique to your vehicle and the position of your air source. Plan ahead carefully when running the air line and always follow these guidelines:

- ☐ Account for axle travel when running the line from the axle to a fixed point on the vehicle. Leave enough slack in the air line to allow for maximum suspension travel in both directions.
- ☐ Avoid leaving large lengths of air line hanging underneath the vehicle where they may get tangled on rocks, sticks, etc.

HINT : **Cable tying the air line to one of your flexible brake lines will account for axle travel and should help keep your line from getting snagged.**

- ☐ Run the air line all the way from the compressor to the differential before trimming either end of the line to length. This will save complications which may arise if the air line has to be removed.
- ☐ Make sure the line does not contact sharp edges or abrasive surfaces that may damage the air line over time.
- ☐ Do not run the air line around tight bends which may kink the air line and restrict or block the air flow.
- ☐ Keep the air line well away from your vehicle's exhaust components. Air lines will melt if subjected to extreme heat.
- ☐ Do not run more air line than necessary. Excess line volume created when coiling the left over hose, using unusually large diameter hose, etc., will increase drain on the compressor tank resulting in the compressor running more often than needed.
- ☐ Support the air line by tying it back with cable ties wherever possible.
- ☐ At the solenoid end of the air line, trim the line to length with a sharp knife.

5 Installing the Air System

☐ To attach the air line to the push-in fitting of the solenoid; insert the line firmly into the fitting, pull outward on the flange of the fitting while holding the line as far into the fitting as possible, and then gently pull outward on the air line to clamp the line in place.

NOTE : **To remove the air line from the push-in fitting; pull outward on the flange of the fitting, push the air line as far into the fitting as possible and hold, push inward on the flange, and then pull the air line free of the fitting.**

5.3 Connection to the Bulkhead Fitting

☐ Trim the air line to length using a sharp knife.

☐ Insert the support spring over the end of the air line - small end first. (Fig.17.)

☐ Insert the outer compression nut over the air line.

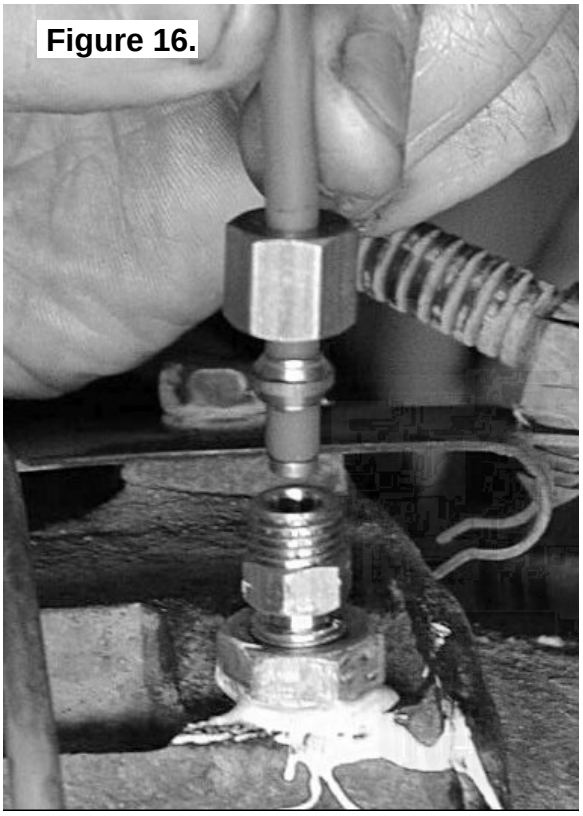


Figure 16.

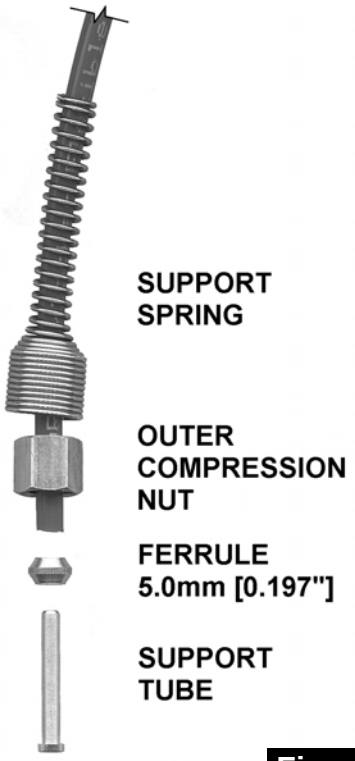


Figure 17.

5 Installing the Air System

- ☐ Insert the 5mm [0.197”] ferrule over the end of the air line. Leave approx. 5mm of tubing between the ferrule and the end of the tube.
- ☐ Insert the support tube all the way into the end of the air line.

HINT : **If the support tube is too difficult to insert, place the end of the air line into a cup of boiled water to soften the tubing.**

- ☐ Insert the tube end all the way into the center compression nut.
- ☐ Screw on the outer compression nut and tighten. The ferrule and support tube are now permanently attached.
- ☐ Assemble the support spring over the outside of the outer compression nut.
- ☐ Secure any loose sections of tube with a cable tie.

ARB AIR LOCKER LOCKING DIFFERENTIALS

6 Mounting & Connecting the Electrical System

6.1 Mounting the Actuator Switch(es)

Air Locker actuator switch(es) can be easily panel mounted inside the vehicle in a 21mm x 36.5mm [0.83” x 1.44”] rectangular cutout.

NOTE : **Only attach the cover plate to the face of the switch once the switch has been mounted and wired correctly as the cover plates are designed to be difficult to remove.**

For reasons of safety and for ease of operation, the *Air Locker* actuator switch(es) should be mounted in a location picked to best suit the operator. Make sure you have taken the following points into consideration:

- ☐ Switch(es) **MUST** be mounted and should never be allowed to simply dangle from the wiring loom during vehicle use.
- ☐ Switch(es) should be within easy reach of the driver. Ideally, any *Air Locker* switch should be able to be operated without physical effort or distraction to the driver. Switch(es) should be mounted within the line of sight of the driver so that switch position (‘ON’ or ‘OFF’) can be visually determined by the rocker position and the illumination state.
- ☐ The position of the switch(es) should best eliminate any possibility of accidental operation by the driver or one of the passengers.
- ☐ Switch cutout position(s) must be located in an area with a minimum of 50mm [2”] of clearance behind the face of the cutout
- ☐ Switch(es) should not be mounted where they will be exposed to water (e.g., in the lower section of an inner door panel).
- ☐ ARB recommends that you apply the *Air Locker* warning sticker (ARB part # 210101) within close visual proximity of the switch location.

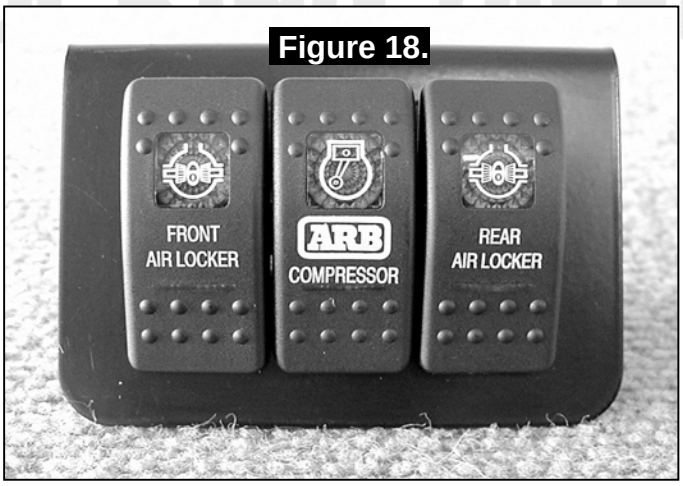


Figure 18.

NOTE :

If no adequate position can be found on existing dashboard panels, a surface mounted bracket (Fig. 18.) may be purchased from your *ARB Air Locker* distributor to suit 1, 2, or 3 switches.

6 Mounting & Connecting the Electrical System

6.2 Wiring the Actuator System

6.2.1 Connection to an ARB Air Compressor

When wiring the *Air Locker* actuator switch(es) and solenoid(s) to an *ARB Air Compressor*, all connections can easily be set up directly from the supplied wiring loom (Fig.19.).

Refer to your *ARB Air Compressor Installation Guide* for details on configuring your installation.

ARB AIR COMPRESSOR WIRING LOOM

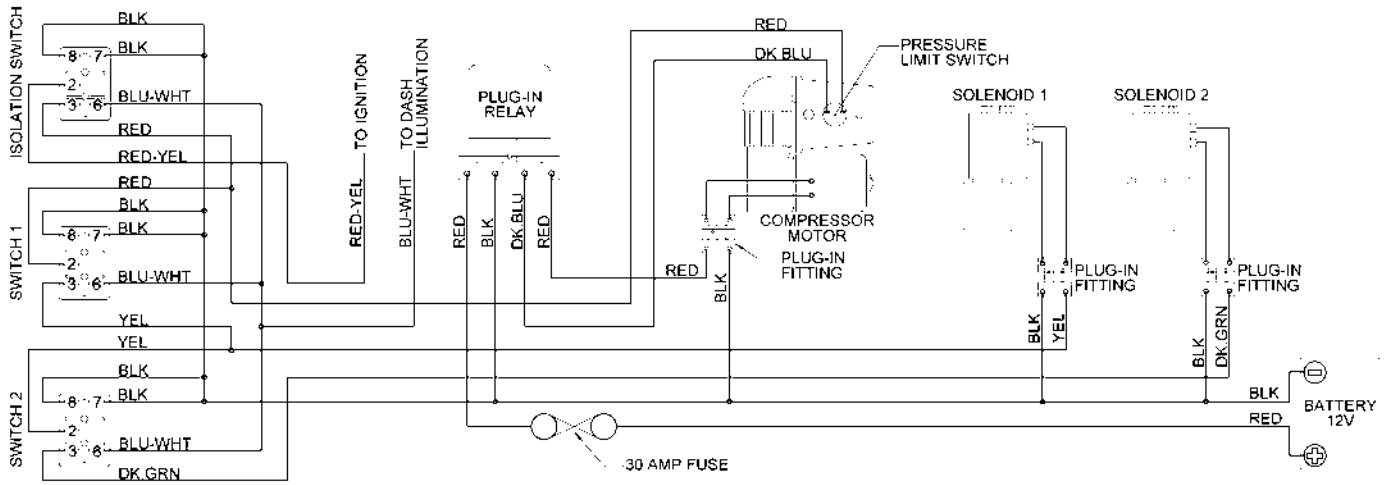


Figure 19.

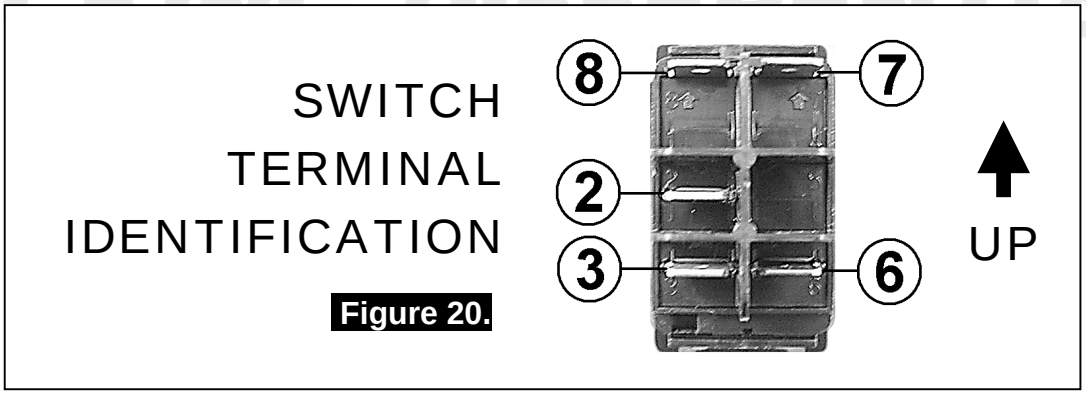


Figure 20.

6.2.2 Connection to an Alternate Air Source

When connecting the actuation switch to an alternate air source, the switch(es) should be wired according to Figures 21. and 22., depending on whether one or two *Air Lockers* will be installed in the vehicle.

6.2.2.1 Single Air Locker System

- ☐ If only one *Air Locker* is to be installed in the system, the switch and solenoid should be wired according to Figure 21. regardless of whether the *Air Locker* has been installed in the front or rear axle of the vehicle.
- ☐ Attach the appropriate switch cover (i.e., 'FRONT' or 'REAR') to the switch.

NOTE : **Refer to Figure 20. for the correct switch terminal identification and switch orientation.**

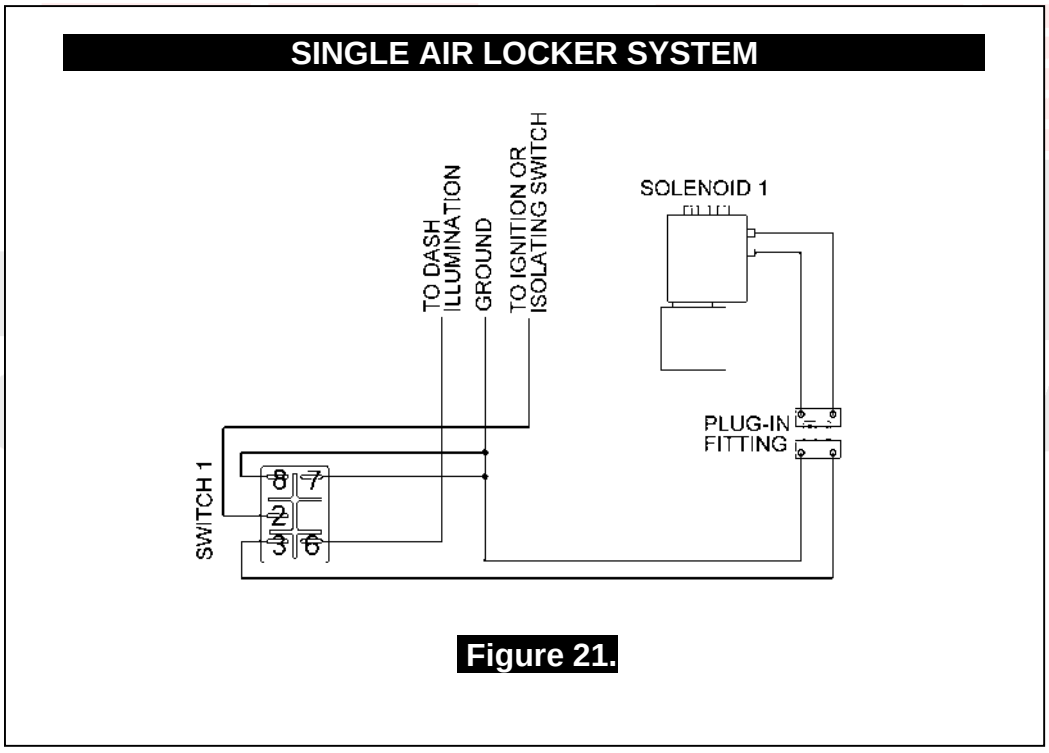


Figure 21.

6.2.2.2 Dual Air Locker System

☐ If two *Air Locker*s are to be installed in the system, ARB recommends that the switches and solenoids be wired according to Figure 22. For safety reasons, this configuration allows SOLENOID 2 to be actuated only if SOLENOID 1 is already on.

☐ Attach the “REAR AIR LOCKER” switch cover to SWITCH 1, and the “FRONT AIR LOCKER” switch cover to SWITCH 2.

NOTE : **Refer to Figure 20. for the correct switch terminal identification and switch orientation.**

☐ Configure SOLENOID 1 as the air line leading to the rear axle *Air Locker*, and SOLENOID 2 as the air line leading to the front axle *Air Locker*.

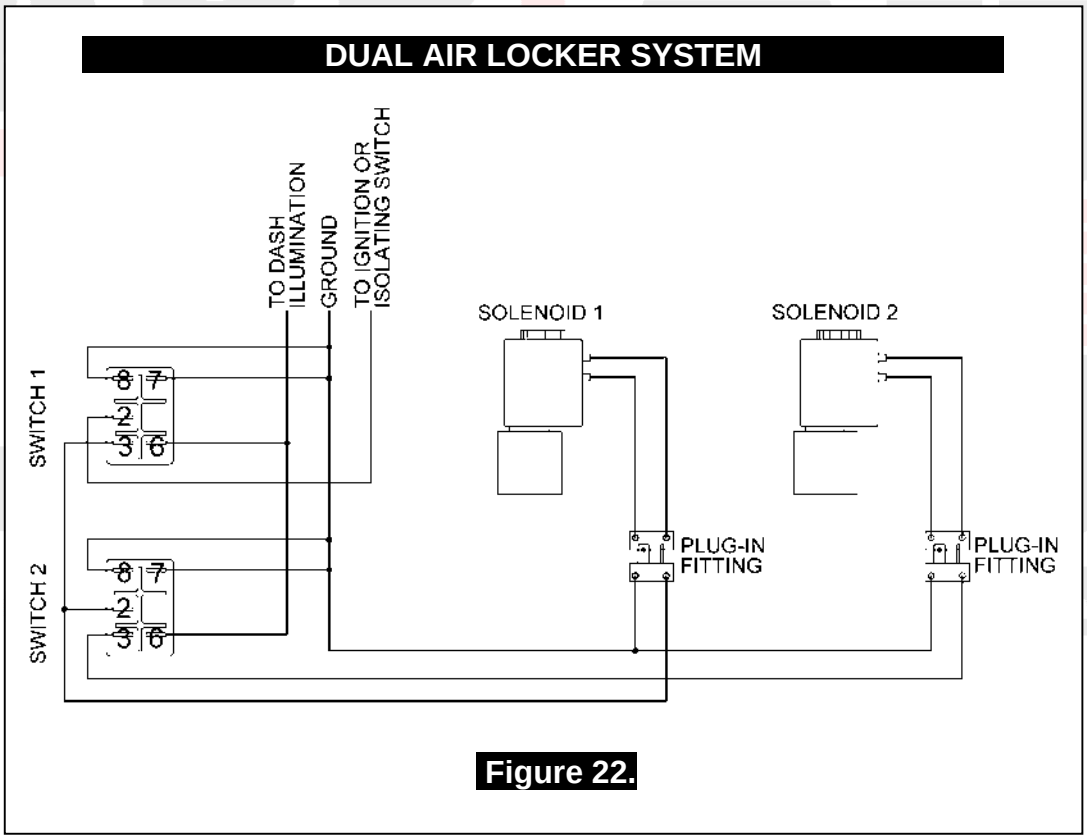


Figure 22.

7 Testing & Final Assembly

7.1 Leak Testing

☐ With the vehicle parked and the engine off, turn the compressor on and wait until the air system is fully charged.

NOTE : **With the *Air Locker*(s) disengaged, the air source (i.e., compressor) should not have to recharge over time. Intermittent recharging without *Air Locker* use usually indicates a leak at the solenoid fittings or at the compressor tank O-ring seal.**

☐ Actuate the *Air Locker*(s).

☐ The compressor should not come on again for a period of at least 15min. Air system recharging within that time period would indicate that a leak is present in the system.

NOTE : **If an alternate air source (e.g., an air cylinder or a belt driven air pump) is used instead of a compressor, the air system will have to be leak tested with a pressure gauge and a shut-off valve in series before the solenoid input.**

☐ If a leak is found to be present, spray a soap and water mixture onto all air fittings in the system while the compressor is fully charged. Bubbles should appear at any leak points.

☐ Check that leaky fittings have been adequately tightened.

☐ Disassemble, clean threads, and reapply thread sealant if leaking persists.

7.2 Testing the Air Locker Actuation

To test that your air system, electrical system, and your *Air Locker* differential is functioning correctly:

☐ Support the vehicle such that the wheels are free to rotate (e.g., on axle stands, a chassis hoist, etc.)

☐ Leave the parking brake off, the transmission in neutral, and the *Air Locker* switch 'OFF'.

7 Testing & Final Assembly

- ☐ Turn the ignition to the 'ON' position (leaving the motor off). The large illuminating symbol on the *Air Locker* switch cover should be 'OFF'.
- ☐ Turn the compressor (or alternate air source) on to charge the air supply up to its maximum pressure.
- ☐ Rotate one wheel by hand.
- ☐ The wheel should rotate freely and the opposite wheel should be turning in the opposite direction without any resistance or mechanical noise from within the differential.
- ☐ Turn the *Air Locker* switch to the 'ON' position. The illuminated symbol on the switch cover should light up.
- ☐ Rotate the same wheel again.
- ☐ Both wheels should rotate together.
- ☐ Turn the switch off again.
- ☐ Rotate the same wheel.
- ☐ The wheels should again rotate in opposite directions.

7.3 Re-Sealing & Filling the Differential

NOTE : **Consult the *ARB Air Locker Operating & Service Manual* for recommendations on differential lubricant specifications.**

- ☐ Replace the differential cover using gasket sealant or a standard differential cover gasket for your make of vehicle.
- ☐ Refill the differential until level with the filler hole.
- ☐ Rotate the differential center 2 full turns.
- ☐ Check the oil level and refill if necessary.
- ☐ Replace filler plug (apply thread sealant to filler plug before inserting if it is a threaded type plug).
- ☐ Wipe differential housing clean of any oil or grease which may collect dirt or other abrasive particles.

7 Testing & Final Assembly

7.4 Post-Installation Check List

Now that the *Air Locker* installation has been completed, ARB recommends that you take the time to complete the following check list just to insure that you haven't missed any of the vital steps.

- ☐ The air system has been leak tested.
- ☐ Thread locking compound was used on the ring gear bolts.
- ☐ All torque settings comply with the vehicle manufacturer's specs and were set with an accurate torque wrench.
- ☐ Differential fluid complies with ARB recommendations and has been filled to the correct level.
- ☐ All air lines and wiring have been securely cable tied to resist snagging.
- ☐ Switch(es) have been securely mounted within operator reach, yet well away from danger of accidental engagement.
- ☐ Switch(es) function correctly and illuminate to indicate that *Air Locker*(s) have been engaged.
- ☐ The *Air Locker* Warning Sticker has been located within close proximity of the actuator switch(es).
- ☐ All operators who are to use the *Air Locker* have read, and fully understand the *ARB Air Locker Operating & Service Manual.*

INSTALLATION PERFORMED BY: _____

DATE OF INSTALLATION: _____

ODOMETER READING: _____

AIR LOCKER SERIAL No.: _____

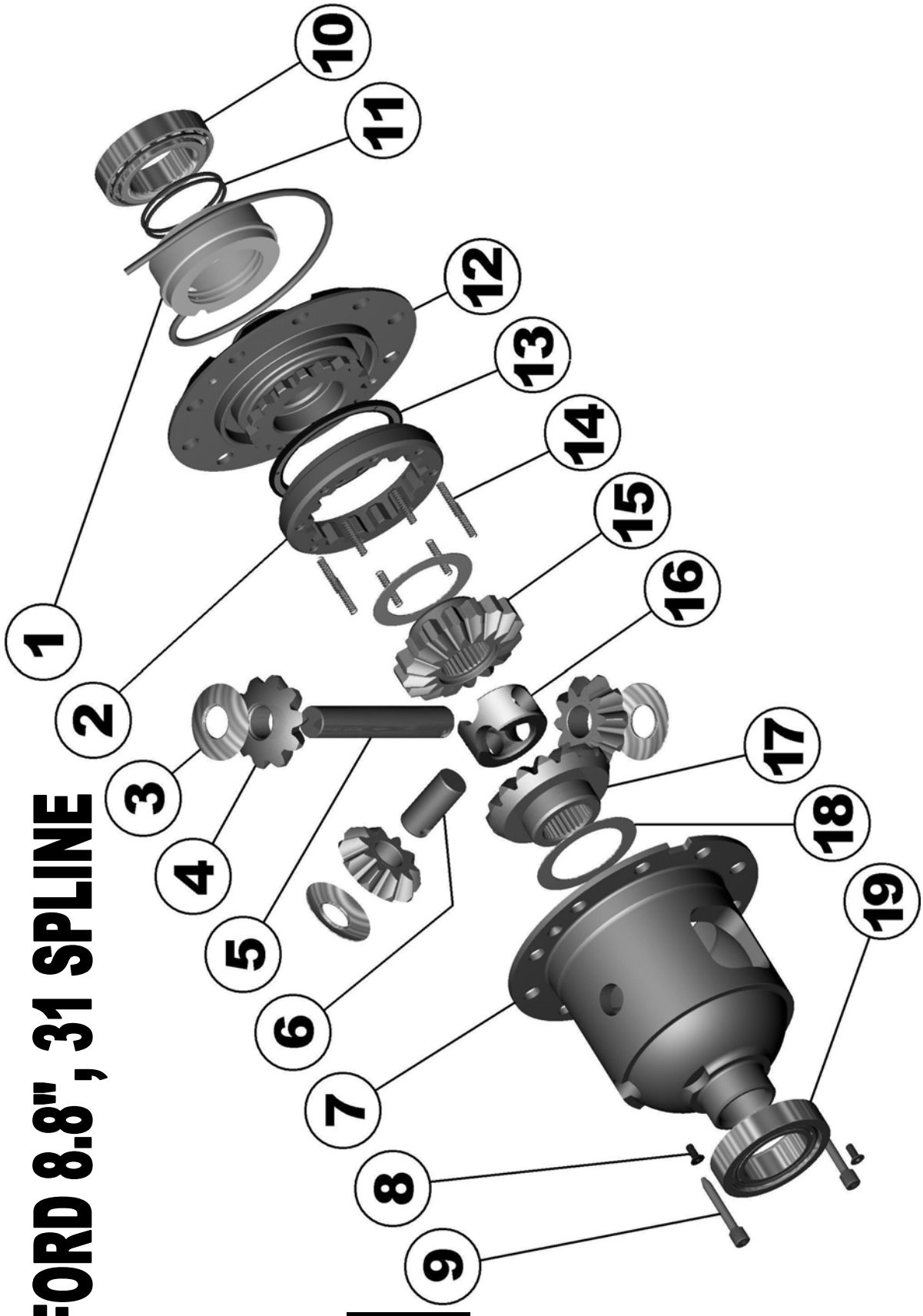
ARB AIR LOCKER LOCKING DIFFERENTIALS

7 Testing & Final Assembly

ARB AIR LOCKER LOCKING DIFFERENTIALS

8 Parts List

8.1 Exploded Assembly Diagram (see itemized parts list overleaf)



RD81
FORD 8.8", 31 SPLINE

Figure 23.

8 Parts List

8.2 Itemized Parts List

(see exploded diagram Fig. 23.)

AIR LOCKER MODEL No. : RD81			
ITEM #	QTY	DESCRIPTION	PART #
1	1	SEAL HOUSING ASSEMBLY	081501
2	1	CLUTCH GEAR	050801
3	3	PINION THRUST WASHER	151110
4	3	PINION GEAR	140701R
5	1	LONG CROSS SHAFT	060204
6	1	SHORT CROSS SHAFT	060403
7	1	DIFFERENTIAL CASE	013001
8	2	CSK SCREW	200213
9	2	CROSS SHAFT RETAINING PIN	120601
10	1	TAPERED ROLLER BEARING	160109
11	2	O-RING, SEAL HOUSING	160227
12	1	FLANGE CAP ASSEMBLY	028401
13	1	BONDED SEAL	160702
14	8	RETURN SPRING	150107
15	1	LOCKING SIDE GEAR	131401R
16	1	SPIDER BLOCK	070902
17	1	SIDE GEAR	131301R
18	2	SIDE GEAR THRUST WASHER	151010
19	---	TAPERED ROLLER BEARING	NOT SUPPLIED
*	1	C-CLIP KIT	CCK005
*	1	NYLON AIR LINE (5mm Dia X 6m long)	170301
*	1	BULKHEAD KIT, O-RING TYPE, 3.5-5mm	170105
*	1	PUSH-IN FITTING,5mm (R1 5 1/8”)	170201
*	1	SOLENOID VALVE (12V)	180103
*	10	CABLE TIE	180301
*	1	NIPPLE, 1/8” BSP, MALE TO MALE	170501
*	1	ACTUATOR SWITCH	180209
*	1	SWITCH COVER (REAR)	180211
*	1	BUMPER STICKER	210102
*	1	WARNING STICKER	210101
*	1	OPERATING & SERVICE MANUAL	210200
*	1	INSTALLATION GUIDE	210281

* Not illustrated in exploded view.